2012
NG STAR
Annual Report

❖❖❖

Dominion
Transmission, Inc.

OMB Control No. 2060-0328
Expires 09/30/2015

Annual Report 2012

Transmission Sector

Company Information

Company Name:	Dominion Transmission, Inc.
Contact:	Roberta J. Gellner
Title:	Manager, Environmental Regulation
Address:	55 Ashby Ridge Road
City, State, Zip Code:	Parkersburg, WV 26104
Telephone:	304-464-5961
Fax:	
E-mail:	roberta.j.gellner@dom.com

Annual Report Summary

- X BMP 1: Directed inspection and maintenance at compressor stations
- ☐ BMP 2: Use of turbines at compressor stations
- X BMP 3: Identify and replace high-bleed pneumatic devices
- X Partner Reported Opportunities *(please specify):*
  1. Reduce pipeline pressure before maintenance (pump-down, field compressors, etc.)
  2. Inject blowdown gas into low pressure mains or fuel gas system (Engine Blow-down Recovery
  3. Use of YALE closures for ESD testing (Capped ESD tests)

Period covered by report: From: Jan. 1, 2012 To: Dec. 31, 2012

Partner Signature Required:

I hereby certify the accuracy of the data contained in this report. Daine Legard 4/25/13

Date

- Because the implementation of some technologies reduces emissions for multiple years, Natural Gas STAR allows certain activities to count towards a company's emission reductions beyond the initial year of implementation. Natural Gas STAR designates the maximum length of time that these reductions may accrue as "sunset dates." The Appendix lists these sunset dates. Companies can report the corresponding methane emission reductions each year up to the allowable sunset date. Or, companies may wish to report reductions only once for the implementation year, and have EPA automatically apply the sunset date and count those emissions for the allowable number of years.
- In addition to reporting methane emissions reductions, you are welcome to include other information about your company's participation in Natural Gas STAR in the "Additional Program Accomplishments" section of this form. The Natural Gas STAR Program will use any information entered in this section to recognize the efforts and accomplishments of outstanding partners.

Additional Program Accomplishments

Additional Accomplishments:

"Fuel Fact" – internal quarterly publication focused on providing employees a snip-it of information about a fuel topic and how employees can impact fuel and/or lost-and-unaccounted-for gas (LAUFG). Included are an introduction to NG STAR; Continuous-Bleed Devices; Pressure Reduction Prior to Blow Downs; and Engine Blow Downs.

LMS Module (on-line learning) for Atmospheric Gas Loss (AGL) Testing – the module is available for all employees, but specifically for those who conduct the AGL tests. It not only provides step-by-step instruction for conducting the test, it also provides safety tips, list of equipment needed, illustrative photos and a quiz at the end.

Main Line – internal employee news magazine focused several articles in past five years to educating and informing employees of initiatives and celebrating successes in reduction of LAUFG.

(examples at end of Annual Report form)

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

Appendix

Methane Emission Reduction Technologies & Practices— Transmission Sector

The list below describes a variety of methane emission reduction technologies that Natural Gas STAR partners in the transmission sector have implemented and reported to Natural Gas STAR. You may use this list as a guide when completing your annual report. ***Sunset dates (i.e., the length of time a technology or practice can continue to accrue emission reductions after implemented) are one year in duration unless otherwise noted in parentheses.*** An asterisk (*) indicates that a technical document related to the technology or practice is available online at epa.gov/gasstar/tools/recommended.html.

Compressors/Engines

- Automate compressor systems operation to reduce venting
- Eliminate unnecessary equipment and/or systems*
- Install automated air/fuel ratio controls (10 years)*
- Install electric compressors (10 years)*
- Install electric motors (10 years)
- Install electric motor starters (10 years)*
- Install lean burn compressor (10 years)
- Lower compressor purge pressure for shutdown
- Redesign blowdown/alter ESD practices*
- Reduce emissions when taking compressors offline*
- Reduce natural gas venting with fewer compressor engine startups and improved engine ignition*
- Replace compressor cylinder unloaders*
- Replace compressor rod packing systems*
- Replace gas starters with air or nitrogen (10 years)*
- Replace wet compressor seals with dry seals (10 years)*
- Use of turbines at compressor stations (20 years)

Dehydrators

- Convert pneumatics to mechanical controls (10 years)*
- Install condensers on glycol dehydrators (10 years)
- Install flash tank separators/controls on transmission sector glycol dehydrators (10 years)*
- Reduce glycol circulation rates in dehydrators*
- Replace glycol dehydrator with separator & in-line heaters (10 years)
- Reroute dehydrators/tank vents to flare or station suction (10 years)*
- Reroute glycol skimmer gas*

Directed Inspection and Maintenance

- DI&M: aerial leak detection using laser and/or infrared technology*
- DI&M at compressor stations*
- DI&M at remote sites*
- DI&M: inspect/repair compressor station blowdown valves*
- DI&M: leak detection using IR camera/optical imaging*
- DI&M: leak detection using ultrasound*
- DI&M: survey and repair leaks*

Pipelines

- Inspect/repair valves during pipeline replacement*
- Pipeline replacement and repair
- Recover gas from pipeline pigging operations*
- Reduce/downgrade system pressure
- Reduced emissions through third-party damage prevention
- Use composite wrap repair*
- Use hot taps for in-service pipeline connections*
- Use inert gas/pigs for pipeline purges*
- Use pipeline pump-down techniques to lower gas line pressure before maintenance *

Pneumatics/Controls

- Convert gas pneumatic controls to instrument air (10 years)*
- Convert natural gas-driven chemical pumps (10 years)*
- Install no bleed controllers (10 years)
- Identify and replace high-bleed pneumatic devices (7 years)*
- Reduce meter run blowdowns
- Replace bi-directional orifice meter with ultrasonic meters*
- Use add-on controls to reduce emissions from pneumatics (10 years)

Tanks

- Install flash gas compressors (10 years)
- Install vapor recovery units on pipeline liquid/ condensate tanks (10 years)*

Appendix (Continued)

Valves

- Close valves during repair to minimize blowdown*
- Design isolation valves to minimize gas blowdown volumes (10 years)*
- Move in fire gates at compressors (10 years)*
- Test and repair pressure safety valves*
- Use of YALE closures for ESD testing*

Wells

- Switch from underbalanced to overbalanced drilling in gas storage field

Other

- Convert natural gas-fired generator to solar power (10 years)
- Improve system design/operation
- Inject blowdown gas into low pressure mains or fuel gas system*
- Install flares (10 years)*
- Replace aged heaters with new efficient gas fired heaters (10 years)
- Require improvements in quality of gas received

Mailing Information:

Standard Mail:
The Natural Gas STAR Program
U.S. EPA (6207J)
1200 Pennsylvania Ave, NW
Washington, DC 20460
U.S.A.

Express/Overnight Mail:
The Natural Gas STAR Program
U.S. EPA (6207J)
1310 L Street, NW
Washington, DC 20005
U.S.A.

NaturalGas
EPA POLLUTION PREVENTER

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

BMP 1: Directed Inspection and Maintenance at Compressor Stations

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) Dominion Transmission Inc.

B. Project summary:
Number of surveys conducted at this facility for reporting period: 27 surveys
Total number of leaks repaired: 9 leaks repaired
Total number of leaks found: 9 leaks found

C. Cost summary:
Total cost of surveys conducted: $ N/A (1)
Total cost of leak repairs: $ N/A (1)

D. Methane emissions reduction: 11,136 Mcf

* *BMP 1 must be reported on an annual basis according to actual survey activity.*

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

X Actual field measurement

☐ Other *(please specify)*:

☐ Calculation using default

Methane emissions reduction = Average annual leak rate for facility (12,200 Mcf) × Reduction efficiency (70%)

E. Total value of gas saved: $ 40,095

Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

F. Do you plan to survey this facility/location next year? Yes (Yes/No)

DTI surveys alternate stations every two years

Optional: Additional details by location

Facility/Location identifier Information	Total Cost of Surveys ($)	Total Cost of Repairs ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)

BMP 1 Comments: *Please use the back of the page for additional space if needed.*

(1) Survey and leak repair costs are not captured individually, but are part of normal O&M work.

Completed AGL Inspections in IMS

Areas	2008	2009	2010	2011	2012
1	29	41	4	42	3
2	130	142	4	135	1
3	93	289	10	284	9
4	65	157	20	158	14
Total	317	629	38	619	27

Inspections were conducted annually until 2009-2010 when the frequency was changed to bi-annual (once every 2 years)

NaturalGas
EPA POLLUTION PREVENTER

Transmission Sector Annual Report

Not Applicable for DTI

OMB Control No. 2060-0328
Expires 09/30/2015

BMP 2: Use of Turbines at Compressor Stations

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) _____

B. Turbine summary:
Number of turbines installed: _____ turbines

Total cost of turbine installations (equipment and labor): $ _____

C. Reciprocating summary:
Number of reciprocating engines retired: _____ engines

D. Equipment description: Please provide specifications for turbines installed and/or reciprocating engines retired

	Turbines	*Reciprocating Engines*
Model:		
Horsepower:		
Fuel Consumption:		

E. Methane emissions reduction: _____ Mcf

F. Are these emissions reductions a one-year reduction or a multi-year reduction? ☐ **One-year** ☐ **Multi-year**

If Multi-year:

☐ Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration (BMP 2 has a sunset period of 20 years).

☐ Partner will report this activity annually up to allowed sunset date.

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

☐ Standard Calculation

Methane emissions reduction per turbine installation = [Emissions rate from reciprocating engine per MMcf of fuel used × Fuel consumption for reciprocating engine (in MMcf/hr)] - [Emissions rate from turbine per MMcf of fuel used × Fuel consumption for turbine (in MMcf/hr)]

Please specify your data source:
☐ Field measurement
☐ Manufacturer specifications

☐ Calculation using default

Methane emissions reduction= [0.234 scf/hp/hr × Horsepower of turbine engines installed × Hours turbine engines were used] / 1000

☐ Other *(please specify):*

G. Total value of gas saved: $_____

Total value of gas saved = Methane emissions reduction (in Mcf) × Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

H. Future activity summary:
How many turbines do you plan to install next year? _____ turbines

How many reciprocating engines do you plan to retire next year? _____ engines

Optional: Additional details by location

BMP 2 Comments: This BMP – replacing existing reciprocating engines with turbines -- is not cost effective at the volume levels of our stations. However, in the past several years, DTI has assessed the volume level needs for new or additional horsepower and have been placing turbines as appropriate.

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

BMP 3: Identify and Replace High-Bleed Pneumatic Devices

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) *Dominion Transmission Inc.*

B. Project summary:
Number of devices replaced: 22 devices

Percent of system now equipped with low/no-bleed units: TBD %

C. Cost summary:
Estimated cost per replacement (including equipment and labor): $ 3,660 /replacement (device)

D. Methane emissions reduction: 5,016 Mcf

E. Are these emissions reductions a one-year reduction or a multi-year reduction? ☐ One-year X Multi-year

If Multi-year:

X Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration (BMP 3 has a sunset period of 7 years).

☐ Partner will report this activity annually up to allowed sunset date.

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

☐ Standard calculation

Methane emissions reduction = [Annual emissions from high-bleed devices replaced (in Mcf/yr) - Annual emissions for the replacement devices (in Mcf/yr)] x Number of devices replaced

Please specify your data source:
☐ Field measurement
☐ Manufacturer specifications

☐ Calculation using default

Methane emissions reduction = 124 Mcf/yr x Number of devices replaced

X Other *(please specify)*:
Used EPA/NG STAR publication for high-end bleed devices

F. Total value of gas saved: $ 10,066

Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

G. How many high-bleed devices do you plan to replace next year? TBD devices

Optional: Additional details by location

Facility/Location identifier Information	# Devices Replaced	Total Cost of Replacements (incl. equipment and labor) ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)

BMP 3 Comments: *Please use the back of the page for additional space if needed.*

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

Partner Reported Opportunities (PROs) - #1

For more details on PROs, visit epa.gov/gasstar/tools/recommended.html

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) Dominion Transmission, Inc.

B. Project description: Please provide a separate PRO reporting form for each activity reported. If reporting a DI&M activity, please use a separate page for each location/facility surveyed.

Please specify the technology or practice that was implemented (choose from the list in the appendix or describe your own):	Please describe how your company implemented this activity:
Reduce pipeline (or station) pressure before maintenance (using pump-down techniques, field compressors, displacing, etc.)	This was implemented as result of a Six Sigma project. For larger projects, Gas Control personnel are alerted when a pipeline blow-down is needed and they work with the Operations and/or Engineering employees to develop the best and safest process to meet customer needs, if possible. Otherwise, local supervision determines whether a pressure reduction can be taken depending on time, safety and operating conditions. Gas loss and reductions are recorded in DTI's Gas Loss Event Tracker (GLET).

C. Level of Implementation *(check one)*:

- ☐ Number of units installed: _____ units
- X Frequency of practice: As appropriate For 2012, 116 times/year

D. Are emissions reductions a one-year reduction or a multi-year reduction? X One-year ☐ Multi-year

If Multi-year:

- ☐ Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration*.
- ☐ Partner will report this activity annually up to allowed sunset date.

E. Methane emissions reduction: 109,650 Mcf

F. Cost summary: Estimated cost of implementing this practice/activity *(including equipment and labor)*: $ N/A (1)

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

- X Actual field measurement
- ☐ Calculation using manufacturer specifications/other source
- ☐ Other *(please specify)*:

G. Total value of gas saved: $ 335,598

Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

H. To what extent do you expect to implement this practice next year?
DTI will continue to evaluate every opportunity and use one of the techniques whenever feasible.

Optional: Additional details by location
NONE

PRO Comments: *Please use the back of the page for additional space if needed.*

(1) Cost for implementation is included in O&M and/or capital costs for project/work.

**Because the implementation of some technologies reduces emissions for multiple years, Natural Gas STAR allows certain activities to count towards a company's emission reductions beyond the initial year of implementation. Natural Gas STAR designates the maximum length of time that these reductions may accrue as "sunset dates." The Appendix lists these sunset dates. Companies can report the corresponding methane emission reductions each year up to the allowable sunset date. Or, companies may wish to report reductions only once for the implementation year, and have EPA automatically apply the sunset date and count those emissions for the allowable number of years.*

NaturalGas
EPA POLLUTION PREVENTER

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

Partner Reported Opportunities (PROs) - #2

For more details on PROs, visit epa.gov/gasstar/tools/recommended.html

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) Dominion Transmission, Inc.

B. Project description: Please provide a separate PRO reporting form for each activity reported. If reporting a DI&M activity, please use a separate page for each location/facility surveyed.

Please specify the technology or practice that was implemented (choose from the list in the appendix or describe your own):	Please describe how your company implemented this activity:
Engine Blow-down Recovery (Inject blowdown gas into low pressure mains or fuel gas system)	This was implemented as result of a Six Sigma project. Five stations were retrofitted to inject the engine blow-down gas into lower pressure fuel lines when there is an active device to use the fuel. Each station is somewhat different, due to original engine/station design. (See "Fuel Fact")

C. Level of Implementation *(check one)*:

Number of units installed: 5 Units (stations)

X Frequency of practice: 43 ~~months~~ of service for 2012 times/year

D. Are emissions reductions a one-year reduction or a multi-year reduction? X One-year ☐ Multi-year

If Multi-year:

☐ Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration*.

☐ Partner will report this activity annually up to allowed sunset date.

E. Methane emissions reduction: 74,175 Mcf

F. Cost summary: Estimated cost of implementing this practice/activity *(including equipment and labor)*: $ 269,691 (5 stations)

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

X Actual field measurement

☐ Other *(please specify)*:

☐ Calculation using manufacturer specifications/other source

G. Total value of gas saved: $ 219,304 (all 5 stations)

Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

H. To what extent do you expect to implement this practice next year?
DTI will continue to evaluate every opportunity and use one of the techniques whenever feasible.

Optional: Additional details by location:

Facility/Location identifier Information	Frequency of Practice/Activity or # of Installations	Total Cost of Practice/Activity (incl. equipment and labor) ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)

Because the implementation of some technologies reduces emissions for multiple years, Natural Gas STAR allows certain activities to count towards a company's emission reductions beyond the initial year of implementation. Natural Gas STAR designates the maximum length of time that these reductions may accrue as "sunset dates." The Appendix lists these sunset dates. Companies can report the corresponding methane emission reductions each year up to the allowable sunset date. Or, companies may wish to report reductions only once for the implementation year, and have EPA automatically apply the sunset date and count those emissions for the allowable number of years.

Gross Totals for EBDRs

Station	Gross Mcf Saved	Gross Dt Saved	Gross $$ Saved	Total Cost	Months in service in 2012
1	13,990	13,555	$38,032	$65,569	12
2	20,358	21,036	$60,017	$48,400	12
3	12,760	13,220	$40,001	$74,762	7
4	22,590	23,307	$67,849	$39,856	7
5	4,477	4,654	$13,406	$41,104	5
	74,175	75,771	$219,304	$269,691	43

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

Partner Reported Opportunities (PROs) - #3

For more details on PROs, visit epa.gov/gasstar/tools/recommended.html

Summary of Emission Reduction Activities

Please include aggregate information in this section for all locations. If multiple facilities/locations are represented, additional detail by specific facility/location can be provided in the table below.

A. Facility/location identifier information:
(If only one location note here, otherwise use table below.) Dominion Transmission, Inc.

B. Project description: Please provide a separate PRO reporting form for each activity reported. If reporting a DI&M activity, please use a separate page for each location/facility surveyed.

Please specify the technology or practice that was implemented (choose from the list in the appendix or describe your own):	Please describe how your company implemented this activity:
Capped ESD Tests (Use of YALE closures for ESD testing)	73 of DTI's 82 stations have caps installed on the ESD stacks to prevent gas loss during planned tests. DOT requires a full blow down test once every 5 years. DTI has staggered its testing so not all stations test in the same year.

C. Level of Implementation *(check one)*:

- **X** Number of units installed: 73 units eligible
- **X** Frequency of practice: 58 capped tested in 2012 times/year

D. Are emissions reductions a one-year reduction or a multi-year reduction? X One-year ☐ Multi-year

If Multi-year:

- ☐ Partner will report this activity once and let EPA automatically calculate future emission reductions based on sunset date duration*.
- ☐ Partner will report this activity annually up to allowed sunset date.

E. Methane emissions reduction: 21,863 Mcf

F. Cost summary: Estimated cost of implementing this practice/activity *(including equipment and labor)*: $ **N/A**-(5)

Please identify the basis for the emissions reduction estimate, using the space provided to show any calculations

X Actual field measurement

☐ Other *(please specify)*:

☐ Calculation using manufacturer specifications/other source

G. Total value of gas saved: $ 60,924

Total value of gas saved = Methane emissions reduction (in Mcf) x Gas value (in $/Mcf) [If not known, use default of $3.50/Mcf]

H. To what extent do you expect to implement this practice next year?
DTI will continue to use capped tests on already fitted stations, and will consider capping in future station design.

Optional: Additional details by location:

Facility/Location identifier Information	Frequency of Practice/Activity or # of Installations	Total Cost of Practice/Activity (incl. equipment and labor) ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)

(5) Cost of implementation is included in O&M and not individually available.

Because the implementation of some technologies reduces emissions for multiple years, Natural Gas STAR allows certain activities to count towards a company's emission reductions beyond the initial year of implementation. Natural Gas STAR designates the maximum length of time that these reductions may accrue as "sunset dates." The Appendix lists these sunset dates. Companies can report the corresponding methane emission reductions each year up to the allowable sunset date. Or, companies may wish to report reductions only once for the implementation year, and have EPA automatically apply the sunset date and count those emissions for the allowable number of years.

Transmission Sector Annual Report

OMB Control No. 2060-0328
Expires 09/30/2015

Previous Years' Activities

Use the table below to report any past activities implemented, but not previously reported to the Natural Gas STAR Program

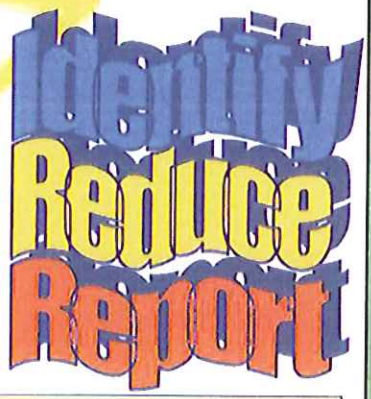
Year	BMP 1 DI&M at Compressor Stations	Total Cost of Surveys ($)	Total Cost of Repairs ($)	Estimated Reductions (Mcf/yr)	Value of Gas Saved ($)
2011	Dominion Transmission, Inc.			68,201	$286,389
2010	Dominion Transmission, Inc.			12,110	$48,833
2009	Dominion Transmission, Inc.			32,889	$141,017
2008	Dominion Transmission, Inc.			9,569	$91,343
Year	**BMP 2 Use of Turbines at Compressor Stations**	**# Turbines Installed / # Reciprocating Engines Retired**	**Total Cost of Installation ($) (incl. equipment and labor)**	**Estimated Reductions (Mcf/yr)**	**Value of Gas Saved ($)**
	N/A	/			
		/			
Year	**BMP3 Identify and Replace High-Bleed Pneumatic Devices**	**# Devices Replaced**	**Total Cost of Replacements (incl. equipment and labor) ($)**	**Estimated Reductions (Mcf/yr)**	**Value of Gas Saved ($)**
	None				
Year	**PRO/Activity**	**Frequency of Practice/ Activity or # of Installations**	**Total Cost of Practice/Activity (incl. equipment and labor) ($)**	**Estimated Reductions (Mcf/yr)**	**Value of Gas Saved ($)**
2011	#1 Pipeline Pressure Reduction	As appropriate		180,786	$810,506
2010	#1 Pipeline Pressure Reduction	As appropriate		196,501	$865,197
2011	#2 Engine Blow-Down Recovery	1 station (12 mos. running)		25,031	$110,811
2010	#2 Engine Blow-Down Recovery	1 station (12 mos. running)		16,829	$77,512
2011	#3 Capped ESD Tests	56 stations		22,098	$92,887
2010	#3 Capped ESD Tests	64 stations		25,931	$119,746
2009	#3 Capped ESD Tests	57 stations		16,721	$71,901
2008	#3 Capped ESD Tests	58 stations		22,653	$216,978

Additional Program Accomplishments

"Fuel Fact"

LMS Module
(on-line training) for Atmospheric Gas Loss (AGL) Testing

Main Line



Fuel Fact:

NG STAR showcases LAUFG initiatives

What is NG Star? Natural Gas STAR is a voluntary partnership program between the U.S. Environmental Protection Agency (EPA) and the oil and natural gas industry to cost-effectively reduce methane emissions from oil and natural gas operations. Partners voluntarily implement a variety of technologies and practices to reduce their methane emissions. By reporting these activities in their NG STAR annual reports, partners share valuable technical information with EPA and other partners who may benefit from the implementation of similar technologies and practices.

What initiatives/technologies will DTI enter first? Currently, there are three suggested Best Management Practices (BMPs) and over 50 Partner Reported Opportunities (PROs) listed as potential NG STAR reportable initiatives. DTI has chosen six of these for its initial reporting year:

- Atmospheric Gas Loss (AGL) and leak inspections in compressor stations;
- identify and replace high-bleed pneumatic devices;
- engine blow-down recovery;
- pipeline pressure reduction prior to blow down; and
- capped ESD tests.

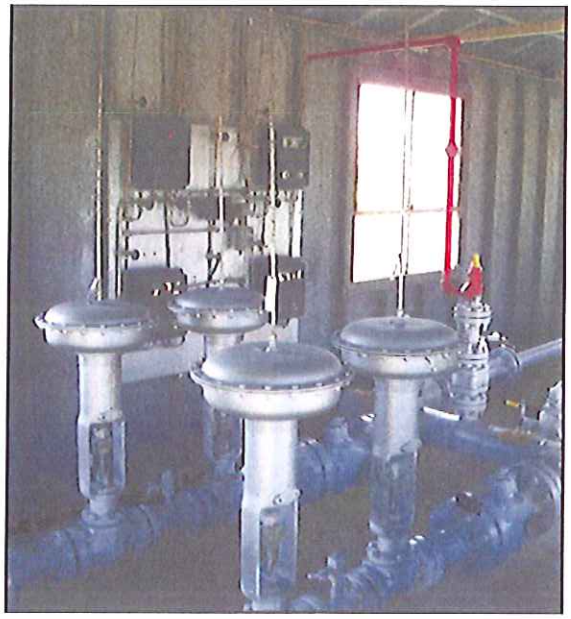
These are all processes that are in place in DTI's gas operations and can be tracked for emissions (gas loss/ fuel) reductions. Several of these initiatives were introduced through successful Six Sigma projects.

What are some of the benefits? NG STAR provides technical assistance via documents, videos, workshops and company-specific consultations. Public recognition is provided through EPA awards for top performers, new partners and endorsers.

Big Impact! Employees can impact DTI's success in the NG STAR program by:

⇒ conducting and reporting pressure reductions prior to blowing down pipelines;
⇒ identifying, assessing and reporting high-bleed pneumatic devices for removal when appropriate; and
⇒ conducting AGL inspections and reporting timely in IMS.

Employees can also impact DTI's future emissions by staying aware of potential opportunities to try new technologies and ideas. All of these efforts contribute to DTI's AIP goal to reduce lost-and-unaccounted-for gas (LAUFG).



Genesee Falls M&R before and after: at left shows old constant-bleed controllers; above shows the new set-up. In addition to the controllers, several feet of tubing containing many connection points and regulation sets with small reliefs, also potential sources of leaks, were eliminated or replaced with non-bleed devices.

Fuel Fact:
Continuous-Bleed Devices: Repair or Replace?

What is a Continuous-Bleed Device (CBD)? Pneumatic devices powered by pressurized natural gas, such as controllers and regulators, release or 'bleed' natural gas to the atmosphere. As a part of normal operation, these devices are used to open and close isolation valves and regulate gas flow and pressure at compressor stations, pipelines and storage facilities.

How do CBDs impact DTI? DTI owns and operates hundreds of these CBDs with bleed rates of between 50 mcf and 5,000 mcf per year. The rate is based on the manufacturer's design, age and condition of the device. This is a source of lost-and-unaccounted-for gas (LAUFG).

Are all pneumatic devices CBDs? No, pneumatic devices come in three basic designs:

- **Continuous** bleed devices - as described above;
- **Actuating** or **intermittent** bleed devices perform as-needed control and release gas only when they open or close a valve, or as they throttle gas flows;
- **Self-contained** devices release gas into the downstream pipeline, not to the atmosphere.

BIG IDEA! In 2011, employees in Zone 2 West (from State Line Station to Caledonia, NY) observed many devices that were bleeding at a rate higher than the manufacturers' listed rate, and decided to address that source of gas loss. A Six Sigma project team modified the replacement process to consider bleed rate, age, condition, availability of replacement parts and location. The former process allowed any device that was working to be repaired and kept in operation. With the new process, 22 devices at 5 locations were identified as not suitable for repair and were replaced with low– or no-bleed devices. In its pilot year, the replacement project saved $12,000 including costs.

What can I do? If you know of CBDs in your operating area that may need to be replaced, notify the Measurement Engineering and Support (ME&S) Field Representative in your area, who will assess the device and coordinate the replacement, if needed. When a CBD is replaced, or if you find a CBD (or an actuating/intermittent device) and you aren't sure whether its gas loss is being reported, contact Tiffany Buffington or Patty Riley in Operations Support, so the savings or gas loss can be captured.

(Photos courtesy of Jim Kazimer, Gas Measurement Specialist Sr., Silver Springs. Industry information from NG STAR publications.)

Actual GLET Event

Event Number: 67685

Total Volume (MCF) for Event: 7451.1102

Total Amount (DT) for Event: 7749.1546

Gas Loss Reduction Value (DT): $35026.18

Event Number: 67685

Total Volume (MCF) for Event: 811.7813

Total Amount (DT) for Event: 844.2526

Gas Loss Event Value (DT): $3816.03

The screen shot above is from an actual gas loss (blow down) event recorded in GLET. The top box shows the amount of gas loss that was reduced – about $35,000 – and the bottom number represents the actual amount of gas that was blown to the atmosphere – about $3,800. The photos to the right are not related to this particular event, but represent general maintenance or construction that could be considered for pressure reduction.

Fuel Fact:
Pressure Reduction Prior to Blow Downs

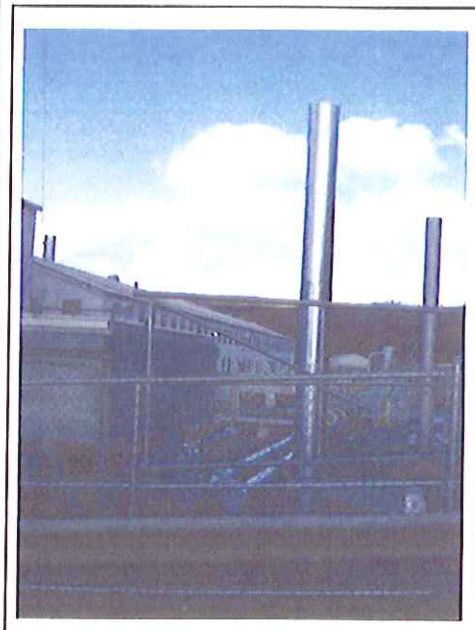
What is the concept behind reducing pressure prior to blow downs? When pipelines must be blown down for construction, testing or maintenance, the gas isolated in that section of pipe is released to the atmosphere, which creates gas loss. Any of the trapped gas that can be "moved" prior to the blow-down reduces gas loss and increases safety.

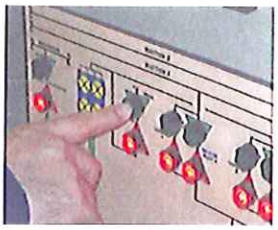
How does it work? Gas Control and the Operations/ Engineering personnel responsible for the outage, determine if a pressure reduction is appropriate and possible for the scheduled blow down. If there is sufficient time to perform the reduction, they estimate the potential gas loss without the reduction to determine if it is cost-effective (which can be done easily in GLET's Temp Calculator). If the reduction process is found viable, they select the appropriate option to move the gas and include it in the outage plan. Finally, the gas loss reduction is reported in GLET along with the actual blow down and purge.

What locations make good candidates? Any pipeline — or station — that is scheduled to be blown down for any reason. If you are part of the planning team for a scheduled outage, contact Gas Control to help you assess your options.

BIG IDEA! So far in 2011, Western Area has used portable field compressors to reduce pressure on two large lines impacted by long-wall mining. By pumping the pressure down before taking the lines out of service to move and re-secure them, DTI personnel prevented almost $65,000 of gas from being blown to the atmosphere.

Through a Six Sigma project focused on pressure reduction prior to blow downs, DTI created 177,000 dekatherms (or almost $750,000) in gas loss reductions in 2010.





Fuel Fact:
Engine Blow Downs

What is an engine blow down and when is it needed? It's the process of isolating the compressor station engine and allowing natural gas that is trapped in the engine, compressor cylinders and associated piping to escape to the atmosphere. This process may be necessary to perform maintenance, in emergency situations, or to facilitate purging and engine start ups.

How is the gas loss reported? The amount of gas loss resulting from an engine blow downs (EBD) is collected in MHealth and transmitted to GLET (DTI's gas loss event tracker). At most stations the operator or responsible person must enter the blow down pressure into MHealth for the gas loss to be calculated and transmitted to GLET. At fully-automated stations no human intervention is needed for collecting the gas loss. Unfortunately, there are still a few stations with no automation. In this case, the operator or responsible person must calculate the gas loss and enter into MHealth. (For help in calculating engine blow down gas loss, contact Patty Riley, 8-630-3256.) Regardless of the station's level of automation, engine blow downs are a significant source of gas loss for DTI and must be reported.

BIG IDEA! Employees at Northeastern Area's Harrison Station have developed a method to capture 80% of the EBD gas that would have been released to the atmosphere. By installing some tubing, a valve and a meter, they recycle most of the EBD gas into the station's fuel system. Operations personnel are looking at ways to implement this success at other stations. EBD gas recovery at Harrison Station saves about $60,000 per year.

Photos were provided by the employees at Sabinsville Station.

Dominion

Atmospheric Gas Loss (AGL)

LMS Training

Atmospheric Gas Loss

Dominion

Atmospheric Gas Loss purpose is to identify and quantify fugitive emissions from:

- **Distance piece vents (compressors)**
- **Packing case vents (compressors)**
- **Blow down valves**
- **Suction & discharge valves**
- **Fire gate vents & other similar vents**

Atmospheric Gas Loss

Objectives:

- Employees will understand the purpose of AGL testing.
- Employees will learn safe and proper measurement methods and procedures.
- Identify tools/equipment necessary for AGL testing.
- Employees will enter measurements collected in IMS and all deficiencies will be addressed.

1st Quarter 2009

Mainline

A Publication for Dominion Transmission Employees and Retirees

A Dekatherm Saved is a Dekatherm Earned

Much like using a stethoscope to listen to a patient's heart, workers use headphones and a microphone to listen to natural gas being compressed through piping at a compressor station.

By placing the microphone of an ultrasonic listening device on the pipe, an employee can hear if gas is leaking and take corrective action. This is one of many methods the company uses to reduce lost and unaccounted for gas (LAUFG).

The value of LAUFG is a large expense each year that affects Dominion Transmission's net income. Annual LAUFG volumes over the past nine years ranged from 8 million to 12 million dekatherms, with related expenses ranging from $39 million to $127 million. The dollar amount depends on the price of natural gas which has ranged from $2.27 to $14.67 per dekatherm over this time period.

Gary Sypolt, CEO-Dominion Energy and formerly president-Dominion Transmission, challenged employees in 2003 to seek out and

(continued on page 3)

Line walking is an important component of reducing lost and unaccounted for gas. Chris Blake, casual rouster, 12 months-G&P Weston, ties a pink ribbon on a line marker to indicate the previous section of line has been walked. A yellow ribbon would signify a leak on the line. Photo by Rocky Stover

Lost Gas . . .

(continued from page 1)

fix problems that resulted in gas being lost or unaccounted for.

"Since that time, many initiatives have been implemented to meet that challenge, said Mary Beth Stanton, director-Operations Support. "Reducing lost and unaccounted for gas is a major goal for DTI. Our goal for 2009 is for lost and unaccounted for gas to be less than 0.96 percent of the supply moving on our system."

Jon Kinney, manager-Measurement Engineering & Support, said, "Dominion Transmission doesn't own the gas we're transporting. We're just taking care of it as we move it to the customer. We need to be good stewards and ensure that the quantity we take off the system is as close as possible to the quantity we bring on. "

One way that gas can be unaccounted for is when a low flow of gas travels unmeasured through an oversized meter. That problem has been largely addressed over the past few years, as smaller low-flow meters have been added at measurement points.

"In such cases, we have a control at the measurement point, so that the larger meter will measure the flow when the customer needs a higher volume of gas," said Kevin O'Donnell, technical specialist-Measurement Engineering & Support, based at Delmont, Pa. "When the low-flow meter becomes full, an automated process causes the larger meter to come on line."

Efforts have been made to compare gas supply and requirements in consistent time periods. Also, chart-driven measurement is being replaced with more accurate electronic measurement.

Other employees have developed 'models' to break the system into smaller areas to identify where problems exist. Analyses are conducted on individual areas to further pinpoint problems. A Gas Loss Event Tracking system gathers information on all gas loss that is identified and reported.

"Field Operations employees are critical to this goal," Stanton said. "They're key to the execution, such as walking the pipelines and finding and reporting leaks."

Ray Seech, area director-Gathering & Production, said, "Our employees walk over 6,000 miles of pipeline per year looking for leaks, which are repaired when found. In addition, we conduct one-day tests to check all inlets and outlets on a segment of the system to find problem areas. Based on the results of these efforts, we've replaced about 36 miles of gathering pipeline over the last three years and we plan to replace about 20 miles of problem gathering pipeline this year."

Marc Halbritter, managing director-Commercial Activities Gathering, said, "The gathering (midstream) business is very competitive. We continue to emphasize finding and fixing our leaks faster, because that is the best way in the short run to minimize our gas losses. In the long run, we are replacing our lines and adding new stations to reduce our pressures. Together, those things will make us more competitive, something especially important in today's low-gas-price environment."

Mainline

A Publication for Dominion Transmission Employees and Retirees

Employees Minimize Fuel Costs, LAUFG

10 Years In, Initiative is Part of Core Business

A vital project that began a decade ago is achieving big results. Employees are minimizing the volume of fuel that Dominion Transmission uses in its operations.

In a nut shell

- Project to minimize fuel use began 10 years ago.
- The initiative has evolved to be part of the core business with a project focus that benefits both the company and its customers.

The Operations Support department was organized to ensure that the effort, which aims to reduce fuel usage and lost and unaccounted for gas, or LAUFG, moves along. Move along it has, and the group observed 10 years of success at an informal celebration in November. Operations Support has championed the focus on fuel gas, including educating coworkers about how they can affect fuel usage.

At the beginning of the project, Gary Sypolt, then president-Dominion Transmission and now CEO-Dominion Energy, challenged employees to seek out and fix problems that resulted in LAUFG. LAUFG is the difference between the quantity of gas coming onto the system and what is taken off the system.

Brian Sheppard, managing director-Pipeline Operations, recently said, "It's impressive how the Operations Support group has grown and affected the results of this initiative. At first, the goal was to get a grasp of the fuel situation and improve understanding and education about being fuel-conscious in the field. Now, it has evolved to be part of the core business with a project focus to that benefits both DTI and our customers."

The cost of natural gas that Dominion Transmission uses to fuel its operations, plus the cost of LAUFG, translates to large sums of money each year.

Mary Beth Stanton and Brian Sheppard flank some of the historical documents recognizing the 10-Year anniversary of Operations Support.

Mary Beth Stanton, director-Operations Support, said, "Since 2002, reducing lost and unaccounted for gas has become a major goal for DTI, and many projects have been implemented to meet the challenge. Fuel represents a sizable expense for the company. Reducing LAUFG helps to control this cost."

Among the major activities aimed at LAUFG reduction over the years are line patrols, leak repairs, bubble tests (examination of small areas within the pipeline system to pinpoint problems), measurement inspections and testing, line replacements and right-of-way cutting.

Meanwhile, the Operations Support group grew into the go-to team for Six Sigma and process improvement assistance. Many of the projects have focused on fuel use and LAUFG.

Two recent examples are engine blow down recovery and the recapture of gas from a transmission pipeline into a gathering pipeline.

Compressor engines traditionally are blown down to perform maintenance, in emergency situations or to facilitate purging and engine start ups. The process isolates the compressor station engine and allows natural gas that is trapped in the engine, compressor cylinders and associated piping to escape to the atmosphere.

Bill Schonwalder, technical specialist III-Automation and Controls Engineering, thought there must be a way to recover that gas. A few years ago, Harrison Station implemented the engine blow down recovery method that is capturing 80 percent of the gas that would have been released into the atmosphere and using that gas for fueling the station.

(continued on page 4)

10 Years of Success . . .

(continued from page 5)

Good results at Harrison Station led to installing the necessary equipment – tubing, valves and meters – at Leidy, Sabinsville, Ellisburg and Greenlick stations this year.

Jason Drummond, superintendent-Lightburn Operations, is leading a Six Sigma project to use gathering pipelines to recapture natural gas blown down from a transmission pipeline. A recent test in Jane Lew, W.Va., showed potential that this idea could be used in nonemergency situations, such as planned pipeline outages or repairs.

A potential snag in the process – a Federal Energy Regulatory Commission regulation that prohibits movement of natural gas from a transmission pipeline to a gathering pipeline – was averted by the Certificates group, which received FERC approval for the process as long as the reroute was temporary.

"A number of work groups had a hand in the successful test in Jane Lew," said Danny Stuart, manager-Gathering & Production Administration. "Everyone worked together to address problems that came up, making this a promising project to reduce lost gas while minimizing environmental concerns."